

IMPACT OF ORGANISATIONAL CULTURAL FACTORS ON KNOWLEDGE MANAGEMENT IN CONSTRUCTION

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ABSTRACT

Knowledge Management (KM) is a process that focuses on knowledge-related activities to facilitate knowledge creation, capture, transformation and use, with the ultimate aim of leveraging organisations' intellectual capital to achieve organisational objectives. Organisational culture and climate have been identified as major catalysts to knowledge creation and sharing, and hence are considered important dimensions of KM research. The fragmented and hierarchical nature of the construction industry illustrates its difficulties to operate in a co-ordinated and homogeneous way when dealing with knowledge-related issues such as research and development, training and innovation. The culture and climate of organisations operating within the construction industry are profoundly shaped by the long-established characteristics of the industry, whilst also being influenced by the changes within the sector. Meanwhile, the special project-based structure of construction organisations constitutes additional challenges in facing knowledge production. The study this paper reports on addresses the impact of organisational culture and climate on the intensity of KM activities within construction organisations, with specific focus on the managerial activities that help to manage these challenges and to facilitate KM. A series of semi-structured interviews were undertaken to investigate the KM activities of the contractors operating in Hong Kong. The analysis on the qualitative data revealed that leadership on KM, innovation management, communication management and IT development were key factors that impact positively on the KM activities within the organisations under investigation.

Keywords: Contractors, Hong Kong, Knowledge management, Organisation culture

INTRODUCTION

Knowledge Management (KM) is a process that focuses on knowledge-related activities to facilitate knowledge creation, capture, transformation and use, with the ultimate aim of leveraging organisations' intellectual capital to achieve organisational objectives (Sveiby, 1997). As with any business process, KM is perceived as a process that receives input from its context, and produces output (in this case knowledge) to serve the purpose of achieving organisational objectives (Mouritsen, 2004). It has been proposed that within a project-based environment, some factors of organisational culture and climate such as structure, strategy, policy, and motivation have direct impact on people, process and technology that carry out KM activities and ultimately influence an organisation's knowledge content (Egbu, 2004).

Despite recent efforts in conceptual model proposition and exploratory studies, a deeper understanding of how organisational culture and climate affect KM activities within construction organisations is limited (Egbu et al., 2003a). The research this paper reports on addresses this research need by investigating the impact of key cultural factors on the intensity of KM activities within construction organisations. First, the paper briefly explains the concept of organisational culture and climate, their influence on KM and the managerial actions that help to create an internal cultural environment that fosters KM activities within the construction organisations. Second, it presents findings from 15 interviews undertaken with managerial staff members employed by 12 contractors operating in Hong Kong. These interviews aimed to elucidate how organisational culture and climate affected the extent to which KM activities were implemented within a range of contractors with diverse internal cultural environments. Third, it discusses the results of the interviews and proposes some suitable actions to develop and reinforce a culture within construction organisations that motivate KM.

THEORETICAL BACKGROUND

Organisational Culture and Climate

Functioning within the background of an organisation, culture is the collection of overt and covert rules, values, and principles that ensure and guide organisational behaviour (Burke and Litwin, 1992). Whereas more in the foreground of organisation, climate is held to be a summary of perception of how an organisation deals with its members and environment (Ostroff and Schmitt, 1993). Therefore, the capacity of organisational culture to enable changes to internal structures and systems is further recognised as critical success factors for effective exploitation of organisational knowledge resource (Sutton, 2001).

Cultural Factors' Impact on KM within Construction Organisations

The construction industry is characterised as being a highly turbulent, rapidly changing, very complex, and extremely competitive business environment (Price and Newson, 2003). Within this environment, emerging issues attributed to changes resulting from technology and market advances increasingly demand collaborative practice across traditional professional boundaries, leading to the emergence of knowledge-based tasks as a central focus of organisational operations (Chan et al., 2001). Nevertheless, the fragmented and hierarchical nature of the construction industry illustrates its difficulties to operate in a co-ordinated and homogeneous way when dealing with knowledge-related issues such as research and development, training and innovation (Barthorpe et al., 2000). To overcome this problem, the construction industry has moved the focus towards more innovative and effective procurement methods, supply chain management and collaborative approaches such as partnering (Phua and Rowlinson, 2003).

It can be expected that the culture and climate of organisations operating within the construction industry are profoundly shaped by the long-established characteristics of the industry, whilst also being influenced by changes within the sector (Egbu et al., 2003a). It has been empirically revealed that factors such as 'a climate of openness in organisation'; 'a shared vision in building knowledge'; and 'committed leadership to learning' were actively performed by contractors to sustain a culture of double-loop

learning (Kululanga et al., 2002). A recent exploratory research (Egbu et al., 2003a) also identified three major cultural promoters for knowledge productions within construction organisations, i.e.: ‘an environment which encourages innovation to deliver better value’; ‘willingness to embrace technological development including IT’; and ‘awareness of the importance of KM including the provision of leadership’. Conversely, ‘time pressure’, ‘inward looking silo mentality’, ‘reluctance to change or to embrace new ideas and development in the sector’ were the three (3) frequently-cited obstacles. Additionally, recent studies (Egbu et al., 2003b, Stewart et al., 2004) suggest that adoption of IT to support knowledge sharing could bring about a cultural change within organisations; meanwhile, organisational culture factors also impact upon IT implementation. Cultural barriers to IT implementation were identified as: lack of organisational strategic planning; conservative business practices; resistance to change; and reluctance to invest in innovation.

Managerial Actions to Motivate KM Activities

In view of the above, the key organisational culture and climate factors that encourage KM activities within construction organisations can be summarised into four major perspectives, i.e.: ‘leadership on KM’; ‘innovation management’; ‘communication management’; and ‘IT development’. The corresponding managerial actions identified by previous studies (Bossink, 2004, Egbu et al., 2003a, Egbu et al., 2003b, Kululanga and McCaffer, 2001, Moffett et al., 2003, Stewart et al., 2004) found to have fostered a KM-friendly internal cultural environment under each perspective are summarised as following:

Leadership on KM

- Have shared vision for managing organisational knowledge;
- Have committed leadership to manage organisational knowledge;
- Problems/ errors are discussed openly.

Innovation management

- Innovations are rewarded;
- Innovations to deliver better cost-effectiveness are encouraged;
- Divisions, departments, construction sites often work jointly on innovations;
- Interdisciplinary team work is encouraged;
- Formal and informal innovation activities are integrated.

Communication management

- Teams look to see how they can contribute more to the company;
- Lateral communication structure between construction sites is adopted;
- Lateral communication structure between construction sites and functional departments is adopted.

IT development

- Senior management support IT development;
- IT and its applications are developed based on a strategic plan;
- IT and its applications are developed with a clear vision of business needs;
- IT is adopted with a view to change traditional business processes;
- IT is designed to aid efficient decision-making;
- IT applications are designed to share information across the whole organisation;
- Employees are trained to use IT.

RESEARCH METHODOLOGY

This study is qualitative in nature, and aims to provide enhanced understanding on organisational cultural factors' impact on KM activities within construction organisations. The semi-structured interview format was chosen as the main data collection method. The interview questions were designed to elicit opinions about the different kinds of KM activities executed by the interviewed firms, and the perceived internal environment factors that affect the implementation of these KM activities.

To select sample interviewee candidates, two (2) trade directories were referred to, i.e. the "*List of Approved Contractors for Public Works*" (ETWB, 2005) published through the website of the Environment, Transport and Works Bureau of the Government of the Hong Kong Special Administrative Region; and the "Members List" (HKCA, 2005) of the Hong Kong Construction Association, whose members represent local and overseas contractors operating in Hong Kong. Large- and medium-sized contractors within Hong Kong represent the research target, because they provide a relatively better environment for KM compared with small contractors (Ng, 2003). The firm interviewed were selected based on 1) the scope, indicated by contract values the firms were qualified for public works; 2) nature of work, general or specialised contractors; 3) nationality back ground of the firms, i.e. international, local or Chinese state owned (Hung et al., 2002, ETWB, 2005).

A total of 15 semi-structured interviews were undertaken with top management staff members, department managers and project managers employed by 12 contractors operating in Hong Kong. The interviewees include one chairman, one managing director, six directors, two regional branch managers, three project managers, and two department managers. The 12 contractors include six overseas companies; five Hong Kong local companies; and one subsidiary company of a leading contractor from China. Of these, seven were Group C contractors qualified for public works with contract values exceeding \$50 million (ETWB, 2005); five were Group B contractors qualified for public works with contract values of up to \$50 million; whilst six (6) of them were general contractors and the rest are specialist contractors. These sample contractors engaged in active operations in the Hong Kong market, and were the leading companies in their targeted market segments. Therefore, it was considered that the 15 interviews (that lasted between 40 minutes to 3 hours), provided specific cases, events and actions that helped to clarify and deepen understanding of the KM process within the context of the research target. Secondary qualitative data sources such as local news and corporate websites, annual reports, news magazines and other publications of the interviewed companies were also consulted, concurrently with the interviews.

STUDY FINDINGS

During the interviews, interviewees were asked to describe their organisations' KM activities and KM-related systems, as well as the policies and approaches they had adopted to promote KM activities. The interviews revealed the variation in organisational culture and climate between contractors. The reasons for such variations are many, and include (but are not limited to) the impact of management principles developed on the basis of different national cultures of contractors' home-

countries; the nature of their marketing strategies and established market positions; the length of operation history within the local market; and the extent of localisation. The study found that the intensity of KM activities varies due to such variations within the internal cultural environment.

Leadership on KM

All interviewees acknowledged the importance of KM to their business. Even though few interviewed firms had formal programs or schemes under the title of KM, KM activities such as knowledge creation, acquisition, dissemination and application had been the integral parts of their operational procedures and long established management approaches. The interviewees also indicated that “strategic guidance to KM was critical to the implementation of KM activities.” Committed leadership, (particularly top management leadership) was advised as being paramount to the promotion of KM and the conveyance of KM-related vision to various organisational levels.

For example, during the economic downturn period of 2001-04, a local specialist contractor chose ‘Innovation’ as their core business strategy for maintaining market share. Under the leadership of the firm’s top management, an innovation task force was formed by department heads and key managerial project staff to actively implement the strategy. Through innovation, this contractor was able to achieve higher productivity, as well as cost reduction in the business of constructing deep foundations. In this process, both knowledge acquisition and knowledge application became more intense, through the increased demand for effective knowledge dissemination activities to ensure efficient implementation and continual refinement of the proposed construction technique.

In coping with the same challenges, many contractors appear to have adopted a business strategy wherein they temporarily withdrew from the local market, shifting their focus to more profitable regional markets. In doing so, their business operations were reduced to fewer but more financially justifiable projects; meanwhile, their local marketing and business development activities were less active, and some key staff were re-located to other regional office/s. As a consequence, knowledge acquisition and knowledge application activities through active marketing and intense project operations have substantially decreased, which in turn lowered the capacity of knowledge dissemination. As an interviewee commented: “At the beginning of the past financial year, a business review forum was instigated to cover the KM related areas on a three-monthly schedule. Unfortunately after the second such forum, the practice was not continued due to staff changes and a new management approach / direction.” Another interviewee succinctly stated: “With no sustainable support from large profitable projects, our proposed IT-based solutions to disseminate project knowledge were significantly hindered”.

Innovation Management

Remarking on the role of innovation in construction operations, an interviewee indicated: “Construction, in principle, is a creative industry, because each of our projects is unique. Therefore, innovation is naturally an essential part of operations. All the company needs to do is to encourage the innovative practices”. It was revealed that innovation was adopted as a major approach by leading contractors within the

Hong Kong market to increase productivity, to control cost, to gain technological advantage through creative design, and to apply new technology. The innovative practices ranged from new construction methods invented on site; alternative designs helping to tender; to creative utilisation of information technology. Some contractors' news magazines and websites reported that innovations were rewarded through both monetary and non-monetary terms.

During interviews, it was noted, that interdisciplinary team work represented a characteristics of construction work within the project-based environment. The tendering process was suggested as a very good example. The tendering team is generally formed jointly by functional departments responsible for tendering and cost control, and project teams with experience in works of similar nature required by the tender documents. Innovation was said to be a strategic approach, particularly for bidding for large-scale projects where low profit margin and high technical requirement mean alternative designs are essential for success. This interdisciplinary team work enabled the transfer of knowledge acquired from previous project operations into new innovative designs and construction methods. In the case of joint-venture tendering teams, knowledge could be acquired and transferred mutually between venture partners, and was reflected in the creative designs and methods.

Another example also reflects the cultural factor's facilitation to innovation; a local firm had a cost-effective project information management system developed through several projects as an innovation product of joint efforts made by several project teams, including joint-venture projects. The innovation process was initiated from frontline production units – site offices under the leadership of project management teams, and evolved to meet specific needs of various construction projects, with very little supervision or interruption from head office. The roles performed by the IT team at head office were to co-operate with project teams during the innovation process, to promote the innovative system to other projects, and to build a company-wide system on the basis of innovation. This case clearly showed that leadership and support from various levels of management, effective innovation policy, and flexible and efficient inter-site and inter-department communications had enabled a long period of innovation process that combined a wide range of KM activities.

Communication Management

The field of strategic management acknowledges the importance of tacit knowledge in the protection of an organisation's core capabilities from competitors' covetousness (Baumard, 1999: 220). This was reflected by most interviewees who addressed the tacit nature of project knowledge and the importance of managing tacit knowledge effectively. They revealed that gaining competence on site works, for example, is a typical process of "learning by doing", and tacit knowledge such as skills, experience, knowledge about certain market segments and personal network takes a long time to acquire, and is difficult to externalised. This explains the traditional focus of contractors on tacit knowledge retention and dissemination.

The intention of retaining tacit knowledge is reflected in comments such as "experienced and skilled employees are key organisational assets"; and "people-oriented management create synergy that is essential to business particularly during difficult time." In order to keep the core tacit knowledge asset within the organisations during the economic downturn, most of the local contractors endeavoured to retain

their key professional and managerial staff members. Meanwhile, “empowering policies” were used to motivate project teams, particularly those of large work scale and of joint-venture structure, to look beyond the scope of their own projects, and to assist other teams in operations and innovations. These “people-related” policies appear to play key roles in encouraging effective communication (through both vertical and bilateral structures, as well as formal and informal channels), that facilitate externalisation and dissemination of knowledge. This is particularly so for tacit knowledge; as an interviewee pointed out: “Effectiveness of KM activities depends on the organisation’s internal system of communication and encouraging knowledge sharing is the key to improve the process efficiency.”

Mentoring, brainstorming, regular meetings within or across projects and departments, appear to be frequently utilised tacit knowledge dissemination approaches. The routine project and corporate meetings (e.g. regular project team meetings, monthly project progress review meetings, and innovation task force meetings) were commonly used for sharing experience, to review internal process design, and to discuss process re-engineering for the purpose of reducing handling time, and to improve efficiency. With large-sized contractors, sharing knowledge between regional offices through regular professional seminars, workshops, project meetings and Intranet were also said to be common practices.

The interviews also found that contractors with stronger focus on the local market normally have a very stable team of core managerial and professional staff who had been working with the companies for a relatively long period. Although high context culture characterised by hierarchical relationships, ascribed status and a tendency towards a well-structured formal line of communication were observed (Rowlinson, 2001) in these organisations, mutual respect, trust and friendship between managerial and professional staff established through a long period of co-operation made the communication and decision making styles much more flexible than they superficially appeared. Apart from formal communication structures, informal communication channels of local characteristics such as lunch and dinner meetings were also common. These channels appear to play a paramount role in complementing the formal structures in enabling knowledge sharing.

IT Development

In terms of explicit knowledge management, establishing and maintaining IT systems was frequently addressed during interviews. The systems for managing specific internal processes, such as project management systems, ISO document systems, cost and financial control systems, technical information archives or method statement data banks, though varied in degrees of technological sophistication, had already been widely adopted by most contractors to facilitate dissemination and utilisation of explicit knowledge in internal processes. The large contractors with comparatively larger market share and longer operational history within the local market had been in the process of building or deploying an Internet-based corporate wide computer system, which is flexible enough to bring together programme and cost information; to present value analysis-type information to project managers; to enable e-trading in procurement and supply chain management; to offer access to clients for open book framework contracting (Kumaraswamy et al., 2006). In other words, these contractors were endeavouring to use information technology to facilitate more efficient and

effective explicit knowledge utilisation and sharing between stakeholders in the supply chain of their business.

Although the high cost of IT systems was said to be a concern for most of the interviewed leading contractors (particularly during the economic down-turn), the IT system integration process had been an ongoing project, even though their scopes and approaches varied. Larger companies with better financial resources appear to have clearer vision and a more sophisticated strategic plan for the system development, and projects were normally handled by a combined team of personnel from the contractor and a software provider. It seems that medium-sized contractors adopted in-house development as the primary approach, focused on consolidating the project control system, and depended on larger projects for resources as well as the trailing and testing of the IT system. In order for both approaches to be successful, top management support and collaboration across the boundaries of various professions were said to be the key. The most difficult task was said not to produce IT technical solutions, but to motivate the different functional units such as finance management, procurement and supply chain management, and project management to work together to generate new procedures and interfaces to enable previously isolated systems to communicate with each other, and particularly in taking a more radical approach to creating a new system. Risk-averse attitudes and particularly the boundaries between overseas headquarters and Hong Kong branches, between the functional departments, between head office and construction sites, and those between different professions were said to be the primary barriers to both system development and implementation. Therefore, under the circumstances where strong top management leadership and clear strategic plans were presented, the system development was smooth; where these were absent, the project was idled whenever cultural barriers were strong. Nevertheless, the interviewees also indicated that the deployment of sophisticated IT systems allowed more efficient information transfer and sharing within the organisation, which enabled a more effective and transparent decision-making process. This in turn helped to increase confidence in the adoption the new IT system and to overcome culture barriers such as conservative business practices and resistance to change.

CONCLUDING REMARKS

The study provided insights into the influence of organisational cultural and climate on the KM activities within the contractors. The project-based environment and the uniqueness of construction projects bring the contractors' challenges in KM implementation, as was indicated by the literature review. In managing these challenges, the contractors have incorporated managerial approaches such as interdisciplinary team work; collaboration across organisational boundaries, innovation, vertical and lateral communication structures; formal and informal communication channels and IT system development into their organisational climate to facilitate knowledge acquisition, creation, dissemination and application. However, for these approaches to be effective, certain policies need to be in place to ensure the presence of beliefs and values of the organisational culture that enable KM behaviours and actions.

Firstly, strategic guidance and top management leadership are essential for implementation of KM. KM implementation will be much more effective if KM

related tactics such as innovation, joint-venture, and new technology utilisation are formulated as core components of corporate strategy; thereby ensuring accessibility of management support and resource allocation to enable the implementation process. Secondly, reward and incentive systems should be used to motivate tacit knowledge externalisation (Nonaka and Takeuchi, 1995), which is the key to knowledge asset building in the construction process. Innovative ideas, methods, and designs are a natural product of operations. Without proper motivational policies, it is difficult to externalise and share this knowledge due to tight time schedules and risk-averse attitudes, thus it is also difficult to form into the knowledge synergy of the company, and it can easily be lost in dynamic project delivery circles and team structures. Thirdly, empowering policies to promote autonomous work and task identity are important to increasing the sense of responsibility, and hence the willingness to produce new knowledge through activities such as invention and innovation. Fourthly, large and technologically-intensive projects are the contractors' resource and profit centres, and a major base for knowledge creation and application. In addition to empowering project teams to innovate, it is also paramount that the company motivates these projects to take the lead in sharing the created knowledge with other production units. Finally, IT systems integration and development should be undertaken under the guidance of clear vision and strategic plans, and supported by the top management team.

This study was undertaken with only one type of construction organisations within a specific region, and employed the semi-structured interview as the major component of the research design. Future research would benefit from diverse research methods such as in-depth case studies, and empirical study, as well as greater sample diversity in terms of size and category of organisations, and also cultural context.

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